

## AMENDMENTS TO CLAIMS

Please cancel claims 1, 22-31, 33-36, 38, 40, 43, 61, 63, 65, and 67, and amend claims 3-15, 18-20, 32, 37, 39, 44, 45, 47-49, 51-53, 55-57, and 59. Claims 2, 16, and 17 were previously canceled, claims 41, 42, 46, 50, 54, and 58 were previously withdrawn. All pending claims are reproduced below, including those that remain unchanged.

1. (Canceled).
2. (Canceled).
3. (Currently amended) The A method of ~~claim 1~~ for shaping optical elements, comprising:
  - creating an annular plasma;
  - injecting a flow of a species into the annulus center of the annular plasma
  - to create at least one reactive species; and
  - using reactive atom plasma processing for the damage-free shaping of a surface.
4. (Currently amended) The A method of ~~claim 1~~ for shaping elements out of silicon, comprising:
  - creating an annular plasma;
  - injecting a flow of a species into the annulus center of the annular plasma
  - to create at least one reactive species; and
  - using reactive atom plasma processing for the damage-free shaping of a surface.
5. (Currently amended) The A method of ~~claim 1~~ for shaping silica glass optics, comprising:
  - creating an annular plasma;
  - injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species; and  
using reactive atom plasma processing for the damage-free shaping of a  
surface.

6. (Currently amended) ~~The A method of claim 1~~ for shaping aspheric optics, comprising:

creating an annular plasma;  
injecting a flow of a species into the annulus center of the annular plasma  
to create at least one reactive species; and  
using reactive atom plasma processing for the damage-free shaping of a  
surface.

7. (Currently amended) The method of claim 21 operating in a subtractive manner.

8. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;  
injecting a flow of a species into the annulus center of the annular plasma  
to create at least one reactive species;  
using reactive atom plasma processing for the damage-free shaping of a  
surface; and  
operating so as not to leave behind a contaminated redeposition layer.

9. (Currently amended) The method of claim 21 using a plume of the plasma.

10. (Currently amended) The method of claim 21 using a plume of the plasma operating as a sub-aperture tool.

11. (Currently amended) The method of claim 21 wherein a plume of the plasma is translated across a workpiece.

12. (Currently amended) ~~The A method of claim 1~~ wherein for shaping surfaces.

comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

monitoring an emission spectrum is monitored to determine process rates.

13. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using carbon tetrafluoride (CF<sub>4</sub>) in argon to create the plasma.

14. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using C<sub>2</sub>F<sub>6</sub> in argon to create the plasma.

15. (Currently amended) ~~The A method of claim 1~~ for shaping surfaces, comprising:

creating an annular plasma;

injecting a flow of a species into the annulus center of the annular plasma

to create at least one reactive species;

using reactive atom plasma processing for the damage-free shaping of a surface; and

using sulfur hexafluoride (SF<sub>6</sub>) in argon to create the plasma.

16. (Canceled).
17. (Canceled).
18. (Currently amended) The method of claim 21 operating in an additive manner.
19. (Currently amended) The method of claim 21 for removing damage introduced by previous process steps.
20. (Currently amended) The method of claim 21 for removing surface roughness.
21. (Previously presented) A method for shaping surfaces, comprising:
  - injecting a flow of a species into the center of an annular plasma to create at least one reactive species; and
  - using reactive atom plasma processing to shape and polish a surface.
22. (Canceled).
23. (Canceled).
24. (Canceled).
25. (Canceled).
26. (Canceled).
27. (Canceled).
28. (Canceled).
29. (Canceled).

30. (Canceled).
31. (Canceled).
32. (Currently amended) The method of claim 21, further comprising:  
using the at least one reactive species to react with selected materials  
which comprise the surface.
33. (Canceled).
34. (Canceled).
35. (Canceled).
36. (Canceled).
37. (Currently amended) The method of claim 362 including the step of moving at  
least one of the plasma and the surface relative to the other.
38. (Canceled).
39. (Currently amended) The method of claim ~~3866~~ including the step of moving at  
least one of the plasma and the surface relative to the other.
40. (Canceled).
41. (Withdrawn).
42. (Withdrawn).
43. (Canceled).

44. (Currently amended) The method of claim ~~360~~ operated at one of above and below atmospheric pressure.
45. (Currently amended) The method of claim ~~3862~~ operated at one of above and below atmospheric pressure.
46. (Withdrawn).
47. (Currently amended) The method of claim ~~4366~~ operated at one of above and below atmospheric pressure.
48. (Currently amended) The method of claim ~~360~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
49. (Currently amended) The method of claim ~~3862~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
50. (Withdrawn).
51. (Currently amended) The method of claim ~~4366~~ operable on one of a conductive surface, a non-conductive surface, and a semiconductor surface.
52. (Currently amended) The method of claim ~~360~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
53. (Currently amended) The method of claim ~~3862~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
54. (Withdrawn).

55. (Currently amended) The method of claim ~~4366~~ wherein the step of using reactive atom plasma processing to selectively shape the surface is a deterministic step which can be selectively in one of an additive mode and a subtractive mode.
56. (Currently amended) The method of claim ~~360~~ operated at about atmospheric pressure and at one of above and below room temperature.
57. (Currently amended) The method of claim ~~3862~~ operated at about atmospheric pressure and at one of above and below room temperature.
58. (Withdrawn).
59. (Currently amended) The method of claim ~~4366~~ operated at about atmospheric pressure and at one of above and below room temperature.
60. (Previously presented) A method for shaping surfaces, comprising:  
creating an annular plasma;  
injecting a flow of a species into the center of the annular plasma to create at least one reactive species; and  
using reactive atom plasma processing for the damage-free shaping of a surface to fit a pre-determined contour.
61. (Canceled).
62. (Previously presented) A method for shaping surfaces, comprising:  
creating an annular plasma;  
injecting a flow of a species into the center of the annular plasma to create at least one reactive species; and  
shaping a surface deterministically and damage-free to fit a pre-determined contour.

63. (Canceled).
64. (Previously presented) A method for shaping surfaces, comprising:  
creating an annular plasma;  
injecting a flow of a species into the center of the annular plasma to create at least one reactive species; and  
using reactive atom plasma processing for the damage-free and deterministic shaping of a surface by at least one of:  
selecting a part of the surface to shape;  
selecting a material to shape on the surface; and  
controlling the removal rate of a material on the surface under shaping.
65. (Canceled).
66. (Previously presented) A method for shaping surfaces, comprising:  
creating an annular plasma;  
injecting a flow of a species into the center of the annular plasma to create at least one reactive species; and  
shaping a surface deterministically and damage-free by at least one of:  
selecting a part of the surface to shape;  
selecting a material to shape on the surface; and  
controlling the removal rate of a material on the surface under shaping.
67. (Canceled).